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Choosing the Real Interest Rate to Value Fully Indexed Pensions

Professor James E. Pesando, 1988

Public Sector Pensions Consultations

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Report #1

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(i) Executive Summary

1. In a pure defined benefit plan, the real interest rate to be used in valuing a fully indexed annuity is the real interest rate on the investment portfolio which enables the plan sponsor to immunize the investment risk.[1] This holds true regardless of whether the plan sponsor chooses to hold this investment portfolio.
2. If Index-linked Mortgages (ILM's) were more widely available, the real interest rate on ILM's would be the appropriate rate at which to value a fully indexed annuity.
3. In the absence of a more active market in ILM's, the real interest rate on 90-day Treasury Bills is the appropriate rate at which to value fully indexed annuities. In this event, the relevant rate is the <u>average</u> real interest rate on 90-day Treasury Bills that can be anticipated over the term of the indexed annuity.
4. During the period 1926 to 1987, the real interest rate on 90-day Treasury bills averaged 0.88 per cent. However, during the past 25 years, this real interest rate has averaged 1.82 per cent. During the past 5 years, the real interest has averaged 5.26 per cent.
5. The most recent issue of ILM's sold at a real interest rate of 5.1 per cent, and the real interest rate on earlier issues has varied from 4.6 per cent to 5.5 per cent. Those who administer the program anticipate

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[1] The pensions protected under the Superannuation Adjustment Benefits Act are fully protected from inflation to a maximum of 8 per cent (and a minimum of zero per cent) in any given year. If the inflation rate as measured by the Consumer Price Index exceeds 8 per cent, the difference is carried forward and applied in a later year. In this Executive Summary, as well as in the text of this report, I abstract from the complications posed by these carry-forward provisions.

that the real interest rate on ILM's will decline, especially if the contractual indexing of pensions becomes more widespread.

6. The fact that real interest rates on fixed-income securities are at historically high levels complicates the problem of selecting the rate with which to value an indexed annuity. So, too, does the existence - but not yet the widespread availability - of ILM's.

7. There are two major sources of uncertainty: (1) the length of time over which the historically high level of real interest rates will persist, and (2) the rapidity with which ILM's (or other indexed financial instruments) will become more widespread.

8. If Treasury bills are assumed to represent the hedging vehicle, the appropriate valuation rate would be 2.5 per cent. If ILM's are assumed to represent the hedging vehicle, the appropriate valuation rate would be 4 per cent. The estimate of 2.5 per cent corresponds to the real return on a portfolio of 90-day Treasury Bills, with allowance for a continued period of historically high real interest rates. The estimate of 4 per cent corresponds to the real interest rate on ILM's, with allowance for the likelihood that the real interest rate will decline from its present level, as contractual indexing of pensions becomes more widespread and the demand for ILM's increases accordingly.

9. <u>In view of the existence (but not yet widespread availability) of ILM's, it seems appropriate to use a valuation rate in excess of the real interest rate that can be anticipated over the long run on Treasury bills. In recognition of this fact, I would propose the use of a valuation rate of 3 per cent.</u>

10. The real interest rate at which insurance companies are prepared to sell fully indexed annuities provides a strong signal as to the appropriate valuation rate, so long as insurance companies are willing to sell these annuities in sufficient quantities to meet the potential needs of large plan sponsors. If insurance companies stand prepared to sell fully indexed annuities in sufficient quantities, the real interest rate offered on these annuities should serve as the appropriate valuation rate.

11. Potential new developments, such as a decision by the Province of Ontario to issue index bonds (as recommended by the Friedland Task Force), merit continual monitoring. If the market for indexed financial instruments becomes more widespread, the case would strengthen for using the real interest rate on these instruments as the valuation rate.

1. The Problem

1.1 Valuing Fully Indexed Pensions (Annuities)

In Report to the Treasurer of Ontario on the Financing of Benefits Under the Superannuation Adjustment Benefits Act and Associated Superannuation Plans, released earlier this year, Laurence E. Coward of William M. Mercer Limited proposes that the interest rate to value fully indexed pensions be set equal to 2 per cent if the government is to base the contribution rates to the PSSF and the TSF "on the economic value of fully indexed pensions." The selection of this interest rate is quite important, since the contribution rates so established are quite sensitive to variations in this interest rate assumption.[1]

In the present report, I have two objectives:

(1) to review the economic analysis which underlies the choice of an interest rate to value fully indexed pensions; and

(2) to provide an estimate of this interest rate.

Like Mr. Coward, I argue that the interest rate to establish the economic value of fully indexed annuities[2] is the real interest rate on the investment portfolio which enables the plan sponsor to hedge (as best

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[1] If this interest rate is increased from 2 per cent to 3 per cent, Mr. Coward estimates that members' contributions (entry age normal cost) will fall from 9.91 per cent to 9.07 per cent for the PSSF, and from 11.24 per cent to 10.24 per cent for the TSF (Part VII, page 5).

[2] Mr. Coward proposes that the interest rate be set equal to 3 per cent if the government "is prepared to absorb the risks of variability in market investments" (SUMMARY, page 8).

as possible) the risk associated with fully indexed pension liabilities. Unlike Mr. Coward, I devote considerable attention to the existence of Index-linked Mortgages (ILM's). ILM's would enable a plan sponsor to immunize the investment risk associated with fully indexed pensions. Although ILM's are - at present - available in very limited quantities, they nonetheless provide a useful signal as to the interest rate to value fully indexed annuities, if (or when) the market for indexed financial instruments becomes more developed. In addition, I estimate that the real interest rate on a portfolio of 90-day Treasury bills (the alternative hedging strategy) is likely to average 2.5 per cent over the long run, or slightly in excess of the 2 per cent assumed by Mr. Coward.

1.2 Complications Posed by the Cap and Carry-Forward Provisions in the PSSF and TSF

The pensions provided by the PSSF and the TSF are not fully indexed to inflation, since the maximum increase in any year is limited to 8 per cent, and the minimum increase is zero per cent. If inflation exceeds 8 per cent or is negative, the difference is carried forward to a subsequent year. Like Mr. Coward, I ignore this complication, and proceed as if the pensions due under the terms of the PSSF and TSF are fully indexed for inflation.[3]

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[3]This approach can be justified by assuming that the probability is remote that the inflation rate will exceed 8 per cent for an extended period of time. Alternatively, if this probability is not remote, the implicit assumption is that the cap would be revised upward in this event.

2. The Analytical Framework

2.1 The Real Interest Rate on the Portfolio which Immunizes a Fully Indexed Pension is the Appropriate Valuation Rate

If a plan sponsor could invest in an indexed financial instrument, the plan sponsor could fully hedge an indexed pension (annuity).[4] Not only would the indexed financial instrument enable the plan sponsor to immunize the pension fund with respect to the indexed pension liability, but its real interest rate would provide the market price of providing the indexed pension. As such, this real interest rate would provide the appropriate actuarial rate at which to value the pensions due under the terms of the plan.[5] If the indexed pension is payable with certainty (which I shall assume), then the indexed financial instrument must be free of default risk.

To financial economists, this is a straightforward proposition. The situation is somewhat more complicated if indexed financial instruments do not exist, or are not available in sufficient quantity to enable a plan sponsor to hedge fully the indexed pension liability. In this case, the appropriate interest rate to value fully indexed pensions is the real interest rate on that portfolio which minimizes the investment risk borne

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[4]Abstracting from mortality risk (which is readily diversified), an n-period indexed mortgage can fully hedge an n-period, indexed annuity.

[5]Analogously, if a plan sponsor elected to hedge a purely nominal pension by investing in a nominal fixed-income security, the interest rate on this security would provide the appropriate actuarial rate at which to value the nominal pension.

by the plan sponsor.[6] As I have shown elsewhere,[7] and as is now widely acknowledged, the investment portfolio which would minimize the risk borne by a sponsor who wishes to hedge a fully indexed pension (in the absence of indexed financial instruments) is a portfolio comprised of 90-day Treasury Bills. The real return on this portfolio is the most stable among those portfolios that can be constructed from stocks, long-term bonds and other fixed-income securities. In addition, Treasury Bills are free of default risk.[8]

To extract signals from the capital market regarding the interest rate at which to value fully indexed annuities, payable with certainty, one can:

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[6]If the pension is fully indexed, it seems likely that only the plan sponsor bears the risk associated with investment performance, at least with respect to the portion of the fund that is set up for (or corresponds to) inactive lives. In this event, the pension plan represents what is sometimes referred to as a "pure" defined benefit plan.

[7]See James E. Pesando, "Valuing Pensions (Annuities) with Different Types of Inflation Protection in Total Compensation Comparisons," Canadian Journal of Economics, August 1984, pp. 569-587 and James E. Pesando, "Assessment of Alternative Formulas for Delivering Inflation Protection," Task Force on Inflation Protection for Employment Pension Plans, Research Studies, Volume 1, pp. 127-201.

[8]The result may seem somewhat perplexing. The fully-indexed pension to be hedged represents a long-term liability, yet the plan sponsor must hold a portfolio of very short-term investments. Further, the plan sponsor is well-suited to bearing the real interest rate risk associated with a long-term index bond, because of the long-term nature of the pension liability. In addition, it is likely that the market will compensate those who bear real interest rate risk by pricing long-term index bonds to yield a higher real return than Treasury bills. Yet this opportunity to earn a higher real return, and thus to reduce pension costs, is not available in the absence of long-term index bonds.

The situation is analogous to that of a plan sponsor who, in a world of no inflation, hedges a long-term, nominal (and thus 'real') pension liability by investing in long-term, nominal (and thus 'real') bonds. If long-term interest rates exceed short-term rates, then the plan sponsor is able to reduce the cost of providing the long-term, nominal annuities and - at the same time - fully hedge the pension commitment.

(1) review the interest rate on indexed financial instruments, such as ILM's; and

(2) establish the real interest rate that can be earned, over the long run, on a portfolio of 90-day Treasury Bills.

Step (2) will not be required if the market for indexed financial instruments is sufficiently well developed that plan sponsors, who so desire, have ready access to these instruments. Since the market for ILM's is not so well developed, Step (2) is still required. This is unfortunate in the context of the problem at hand, since the real interest rate on indexed financial instruments which have a long term to maturity (such as ILM's) is likely to exceed the average real interest rate on 90-day Treasury Bills. (This is due to the fact that holders of long-term indexed financial instruments bear considerable capital uncertainty, since real interest rates do vary, and hence must be compensated by the market for bearing this risk.) Depending upon whether ILM's or 90-day Treasury Bills provide the more realistic hedging opportunity, potentially divergent signals could be provided regarding the interest rate to value fully indexed pensions.

2.2 The Real Interest Rate on a Risky Portfolio is Not the Appropriate Valuation Rate

The real interest rate on an investment portfolio which hedges a fully indexed annuity is the appropriate interest rate to value a fully

indexed annuity, regardless of whether or not the plan sponsor elects to hold this portfolio (and thus to immunize the pension fund from the investment risk associated with fully indexed pension liabilities).

If the sponsor chooses to hold a riskier portfolio (and thus not to immunize) in anticipation of a higher real return, then the higher expected return equals the compensation set by the market for the sponsor's willingness to assume this additional risk. From the perspective of the member, the real value of the pension is certain, and the only way the member could replicate this certainty would be to hold the portfolio which fully hedges the indexed pension liability.[9] Alternatively, if an individual (or a plan sponsor) wishes to purchase an indexed annuity from a life insurance company, one would expect the real interest rate paid on the annuity to reflect the real interest rate (net of administrative expenses and profit margin) that the insurance company could earn on a hedging portfolio.

3. Indexed Financial Instruments

ILM's issued by the Co-Operative Housing Foundation of Canada (and guaranteed by the CMHC), are the only indexed financial instrument that

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[9] If the plan member and the plan sponsor share the investment risk, so that the degree of indexing depends upon the performance of the pension fund, then the degree of risk embodied in the pension fund should influence the choice of the valuation rate. In this event, the pension would not be fully indexed for inflation, unless the fund were invested exclusively in the asset which immunized the risk of a fully indexed liability. If so, the real interest rate on this immunizing portfolio would again surface as the appropriate valuation rate.

is available to pension plan sponsors in Canada. At present, there is about $500 million outstanding in ILM's.[10] This figure is small relative to the accumulated assets of trusted pension funds, which stood at (approximately) $150 billion at year-end 1986; and of RRSP's, which stood at (approximately) $50 billion at year-end 1986.[11] This figure is also small, for example, relative to the assets of the TSF, which stood at $8.8 billion at year-end 1985.[12] At present, it is anticipated that $250 to $300 million of ILM's will be issued to finance new co-operative housing projects each year until 1991. (There exists the possibility, in addition, that ILM's may be used to finance other types of housing initiatives.)

In spite of the relatively small size of the market, the introduction of ILM's in October 1986 by the Co-Operative Housing Foundation of Canada is an important development. ILM's provide an important signal regarding the choice of the interest rate to value fully indexed annuities.

3.1 ILM's in the Canadian Capital Market

In essence, ILM's are long-term (35-year) mortgages, insured by the CMHC, with an agreed-upon real interest rate for the full term of the mortgage. (Salient details are summarized in the Appendix A to this

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[10] Jack Smugler, Co-operative Housing Foundation of Canada.

[11] Keith P. Ambachtsheer, "The Potential Impact of Mandated Inflation Protection on Capital Markets," Task Force on Inflation Protection for Employment Pension Plans, Research Studies, Volume 2, page 7.

[12] Teachers' Superannuation Commission, Annual Report 1985, page 6.

report.) Except for a 6-month lag (for administrative reasons) in the incorporation of the inflation factor, the investor in an ILM receives a guaranteed real interest rate and full protection from inflation. The real return (i.e., inclusive of any realized or unrealized capital gain or loss) earned by the lender in any given year will fluctuate with changes in the real rate of interest, since the agreed-upon real interest rate is set for the full term of the mortgage. If the real interest rate rises, the market value of the mortgage will be beneath its book value, and conversely. The CMHC insures the book value of the mortgage, so that an unrealized capital gain is uninsured, while the lender can recoup an unrealized capital loss in the event of default.

The initial ILM bore a real interest rate of 5.25 per cent, and real interest rates have subsequently fluctuated between 4.625 per cent and 5.5 per cent. The most recent ILM sold at a real interest rate of 5.1 per cent. About 90 per cent of the ILM's issued to date have been acquired by pension funds. Pension funds remain the primary target of those marketing ILM's, and interest by pension fund managers is anticipated to increase if (or when) the indexing of private pensions becomes more widespread. There is as yet no secondary market in ILM's, and hence ILM's are at present not liquid.

At present, the real interest rate on ILM's appears to be high relative to its long-run or equilibrium value. The reasons are as follows:

(1) real interest rates on conventional fixed-income securities remain at levels that are very high by

historical standards, and ILM's must compete with these securities;

(2) at present, ILM's are not liquid since, as yet, there is no secondary market;

(3) the demand for ILM's as a hedge for indexed pensions is likely to increase, and perhaps dramatically, if the indexation of pension benefits becomes more widespread in the private sector; and

(4) an unanticipated increase in the rate of inflation should not affect the real rate of return on ILM's, although it will (based on historical evidence) depress the real rate of return on bills, bonds and stocks, thus implying that ILM's can reduce the risk of a well-diversified portfolio.

In addition, there are a number of institutional factors which may render ILM's unattractive to at least some pension fund managers. Fund managers, especially those who are subject to periodic performance reviews, may be reluctant to purchase ILM's, since the real interest rate on ILM's may be deemed unattractive in the present climate of high real returns. Improvements on this front, such as a decision by rating agencies to exclude ILM's in their rating assessments, would enhance the attractiveness of ILM's and hence place downward pressure on their yields.

3.2 The Recommendation (Friedland Task Force) that the Province of Ontario Issue Index Bonds

The Friedland Task Force notes that the availability of indexed bonds (from the Government of Ontario, Ontario Hydro, the federal government, etc.) would facilitate the adjustments of plan sponsors to mandatory inflation protection. The Task Force recommends (#14):

> "The Ontario government should introduce the sale of indexed bonds." (Report, page 269).

This recommendation is important for two reasons. First, the possibility that indexed bonds may be introduced by the Province of Ontario (or other government or Crown corporations) suggests that the market for indexed financed instruments may soon expand in scope. If the size of this market does increase significantly, then its presence should influence the choice of an interest rate to value fully indexed annuities. Second, the Task Force implicitly acknowledges that the demand by plan sponsors for indexed financial instruments is likely to increase if inflation protection is mandated. As previously noted, this development should place downward pressure on the real interest rate required by investors on ILM's, as well as on the real rates on any new indexed financial instruments that might subsequently be introduced.

There now exists an active market for index-linked bonds in Great Britain, following their introduction in March 1981. The real interest rate on index bonds has varied, although over a narrower range in recent years. Between January 1984 and May 1986, for example, the median yield on newly issued index bonds was 3.35 per cent, while new issue yields

ranged from 3.00 per cent to 3.86 per cent.[13] At present (April 22, 1988), the real interest rate on long-term index bonds in the U.K. ranges from 3.62 to 3.78 per cent, with a median of 3.72 per cent. These rates are well beneath the 5.1 per cent rate on the most recently issued ILM.

Because of other differences in financial markets in the U.K. (including taxes, regulatory constraints, perceived commitment of the government to a strong anti-inflationary stance), one must exercise caution in drawing inferences from the U.K. experience with index-linked bonds. Nonetheless, in light of the international mobility of capital, it seems reasonable to assume that the real rates on index bonds that prevail in the U.K. contain some information for Canada. Loosely, that message would appear to be that real interest rates on indexed financial instruments, if free from default risk, are likely to settle - over the long run - at real rates substantially less than the 5.1 per cent rate offered on the most recent ILM.

3.3 Overview

Newly issued ILM's bear real interest rates slightly in excess of 5 per cent. However, the volume of outstanding ILM's is small relative to pension fund assets, and there is good reason to believe that the real interest rate on ILM's will decline from its present level. ILM's provide an almost ideal instrument to hedge fully indexed pensions, and

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[13] This excludes the 2's of 1990, which were (apparently) issued in September 1984 at a yield of 5.22 per cent. On the same day of issue, the 2.5's of 2009 were sold at an initial yield of 3.56 per cent. See Alicia H. Munnell and Joseph R. Grolnic, "Should the U.S. Government Issue Index Bonds," mimeograph, Federal Reserve Bank of Boston, November 1986.

demand for ILM's (and other indexed financial instruments) is likely to increase when (or if) the indexing of private pensions becomes more widespread.

Because of the relatively small size of the market for ILM's (as well as the likelihood that the real interest rate will subsequently decline), it would be inappropriate to use the present real interest on ILM's to value fully indexed pensions. However, developments in this market merit careful monitoring. If the market for ILM's expands further, or if other indexed financial instruments are introduced, the interest rate used to value fully indexed pensions should be raised to reflect the hedging opportunities so provided.

4. The Real Return on 90-day Treasury Bills

Indexed financial instruments do not exist in sufficient quantity to enable sponsors of large pension plans to use them to hedge indexed pensions. It is thus imperative to examine the real interest rate that is likely to be provided by the alternative (and inferior) hedging strategy.

4.1 The Real Interest Rate on 90-day Treasury Bills

During the period 1926 to 1987, the real interest rate on 90-day Treasury bills averaged 0.88 per cent. However, the average real interest rate during the past 25 years was 1.82 per cent (Table 1).

During the past 5 years, the real interest rate has averaged 5.26 per cent.[14]

Short-run inflation expectations are likely to follow the current inflation rate quite closely, and it is thus possible to identify the real interest rate on short-term instruments such as Treasury bills. At present, the nominal interest rate on 90-day Treasury bills is 8.71 per cent. The year-over-year inflation rate as measured by the Consumer Price Index, as of February 1988, stood at 4.0 per cent. These figures imply a real interest rate on Treasury bills of 4.71 per cent.

Thus, the real interest rate on 90-day Treasury bills is at present well above its historical average, and has remained so throughout the 1980's. The key question is whether the real interest rate on Treasury bills will continue to exceed historical levels for the foreseeable future, implying a corresponding movement in the long-run or historical value.

One can argue that, with the advantage of hindsight, the negative real interest rates that prevailed during much of the 1970's represent an aberration. During the period 1971 to 1978, for example, the real interest rate on Treasury bills averaged minus 1.36 per cent. From this perspective, the average real interest rate over the past 25 years (which is 1.82 per cent) might understate the long-run or normal value. There is nothing in economic analysis which requires that the real interest rate on Treasury bills decline towards its historical average. One need only note, for example, the long duration of the current economic

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[14]The data to 1985 are drawn from Towers, Perrin, Forster and Crosby, Canadian Economic Tables, 1986, Table 11D. The data for 1986 and 1987 are drawn from the Bank of Canada.

Table 1

Real Interest Rates on 90-Day Treasury Bills, 1953-1987

Year	Real Interest Rate	Year	Real Interest Rate
1953	1.63	1971	-1.02
1954	1.20	1972	-1.49
1955	1.03	1973	-3.83
1956	-0.45	1974	-3.99
1957	1.72	1975	-1.98
1958	-0.12	1976	3.15
1959	3.29	1977	-1.64
1960	1.97	1978	-0.06
1961	2.57	1979	1.43
1962	2.62	1980	1.73
1963	1.74	1981	6.24
1964	1.93	1982	5.62
1965	0.88	1983	4.88
1966	1.46	1984	7.49
1967	0.39	1985	5.31
1968	2.26	1986	4.89
1969	2.35	1987	3.79
1970	5.12	1988 (April)	4.71

Source: The data to 1985 are drawn from Towers, Perrin, Forster and Crosby, Canadian Economic Tables, 1986, Table 11D. The data for 1986 and 1987 are drawn from the Bank of Canada.

recovery, in both Canada and the United States. This recovery continues strong, in spite of the historically high level of real interest rates. Nonetheless, some (perhaps considerable) decline from the present level of real interest rates seems likely.

Economists have offered a variety of explanations for the high level of real interest rates that prevails today.[15] These include: (1) large and persistent government deficits; (2) the need for continued monetary restraint, in light of these government deficits; (3) greater understanding by investors of the interaction of inflation with the tax system, with a corresponding increase in the "tax premium" built into nominal interest rates; and (4) increased uncertainty, including increased uncertainty about the future rate of inflation, and a corresponding rise in the risk premium accorded intermediate and long-term bonds. With the exception of (4), all are possible explanations of why the real interest rate on Treasury bills remains so high, measured relative to historical levels.

4.2 Overview

In light of the continuing high level of real interest rates, it seems appropriate to assume that the real interest rate on Treasury bills

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[15] In this regard, it is useful to note that real returns (i.e., interest income plus or minus capital gain or loss) on long-term bonds have actually averaged less than the real interest rate on Treasury bills during the past 25 years. Since long-term bonds are clearly a riskier asset, this result is best viewed as an anomoly reflecting the significant amount of unanticipated inflation that occurred during this period. It would be inappropriate to assume, over the long run, that the real return provided by long-term bonds would fall short of the real interest rate on Treasury bills since the latter are a far less risky asset.

will remain above its historical level for the foreseeable future. This is important, since the real interest rate that is relevant for valuing a fully indexed annuity is not the current Treasury bill rate, but the average rate that is forecast over the term of the indexed annuity.

On balance, I would propose the use of a valuation rate equal to 2.5 per cent, if the immunization of the fully indexed pension is assumed to take place solely through the vehicle of 90-day Treasury bills. I would also propose that this valuation rate be reviewed on a periodic basis, in light of new trends that might be established for the real interest rate on these short-term securities.

5. Summary and Recommendation

There are two major sources of uncertainty in the choice of an interest rate to value fully indexed pensions: (1) the length of time over which the historically high level of real interest rates will persist, and (2) the rapidity with which ILM's (or other indexed financial instruments) will become more widespread. In light of this uncertainty, it seems inappropriate to specify a once-and-for-all choice of this valuation rate. Rather, the choice of the valuation rate should be reviewed on a periodic basis, as the uncertainty surrounding (1) and (2) is resolved.

Economic analysis indicates that the real interest rate on the portfolio which immunizes the risk associated with fully indexed pensions is the appropriate interest rate with which to value these pensions.

If ILM's were more widespread, the choice of the valuation rate would be straightforward. The valuation rate would equal the real interest rate on these indexed financial instruments. With an allowance for a downward movement in these rates as the indexing of pensions becomes more widespread, I would propose the use of a real interest rate of 4 per cent.

At present, 90-day Treasury bills represent the portfolio which best immunizes the risk associated with fully indexed pensions, among those portfolios which could be purchased by a large pension fund. For this reason, the real interest rate on 90-day Treasury bills, anticipated over the long run, should serve as the primary basis for the choice of the valuation rate. I estimate that this real interest rate will average 2.5 per cent. In addition, the valuation rate for fully indexed annuities should be adjusted upwards, by a modest amount, to recognize the fact that the immunization strategy could involve some portion of higher-yielding ILM's.

On balance, I would propose the use of a valuation rate of 3 per cent. This equals the estimate of the average real interest rate on 90-day Treasury Bills over the long run (2.5 per cent), with a modest upward revision (0.5 per cent) to reflect the availability - in still limited quantities - of ILM's.[16]

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[16] In his Report, Mr. Coward notes (Part VI-5) that an insurance company in Canada is now offering fully indexed annuities, with an implied real interest rate (for the insurance company) of 2.8 to 3.0 per cent. Clearly, the real interest rates at which insurance companies are prepared to sell fully indexed annuities provides a strong signal as to the valuation rate, so long as insurance companies are willing (at least in principle) to sell these annuities in sufficient quantities to meet the potential needs of very large plan sponsors.

Finally, the potential for new developments - such as a decision by the Province of Ontario to issue index bonds (as recommended by the Friedland Task Force) - merit continued monitoring. If indexed financial instruments become more widespread, the valuation rate should reflect the potential use of this better, and higher yielding, immunization strategy.

Appendix A: The Indexed-Linked Mortgage (ILM)

The salient features of the ILM are as follows:

(1) the interest rate is set annually, and equals the agreed-upon real interest rate for the full term of the mortgage plus an inflation rate factor, equal to the annual inflation rate as measured by the CPI for the 12-month period ending six months prior to the anniversary (interest adjustment) date;

(2) the (book) value of the mortgage plus accrued interest at the time of default is fully insured by the CMHC under the National Housing Act;

(3) mortgage payments are adjusted on the anniversary date, and are increased by the same inflation factor as for the interest rate, less 2 per cent, which thus produces a downward 'tilt' of 2 per cent per year in the real stream of mortgage payments;

(4) the mortgage has a 35-year term, with a 30-year amortization period (so that the amortization period can be extended if inflation over the life of the mortgage averages more than the inflation rate assumed to set the initial payments, or if the co-operative experiences financial difficulties and seeks the deferment of a few of the annual increases); and

(5) the borrower has no prepayment option (so the lender is protected from an early repayment in the event that, say, real interest rates fall).